

# *Analysis on the Rule of Medication in the Treatment of Pulmonary Nodules by Professor Ma Zhanping*

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**Abstract:** To explore the rule of medication of Professor Ma Zhanping in the treatment of pulmonary nodules by using data mining technology. Medical records of patients with pulmonary nodules who first visited Professor Ma Zhanping's clinic from January 2023 to December 2023 were collected. Excel2021 was used to analyze the frequency, sex, taste and normalization of traditional Chinese medicine, and SPSSModeler18.0 was used to analyze drug association rules for network display. 108 prescriptions were included, including 137 kinds of traditional Chinese medicine. The total frequency of use was 1564 times, and there were 16 kinds of drugs with frequency  $\geq 30$  times. The top 10 were licorice, codonopsis codonopsis, Bupleurum, orange peel, Coix seed, Angelica sinensis, Tangerine kernel, Astragalus, Thunbertillaria and cohote. The four Qi are mainly warm, the five taste are mainly sweet and bitter, and the channel is mainly lung, followed by stomach channel. Dr. Ma Zhanping believed that the main pathogenesis of pulmonary nodules was deficiency of healthy qi and aggregation of phlegm and blood stasis. The core prescription for treating this disease was tonifying deficiency drug, strengthening spleen drug, activating blood stasis drug and clearing heat drug.

## 1. Introduction

Pulmonary nodule (PN) refers to the lesions in lung tissue with diameter  $\leq 3$ cm, regular or irregular shape, single or multiple, and clear or unclear boundaries [1]. At present, pulmonary nodules are mainly diagnosed by clinical information, CT and magnetic resonance imaging. CT diagnosis is the most common examination measure in current clinical diagnosis [2-3]. PN can be a benign lesion or an early or advanced stage of a malignant lesion [4]. Due to environmental pollution, the incidence of lung cancer is increasing year by year, with about 781,000 lung cancer patients and 626,000 deaths every year in China [5]. For the treatment of PN, the main strategy of modern medicine is to regularly review chest CT, and if it is found to increase and change, it should be surgically removed as soon as possible. The treatment of PN during follow-up period and after the removal of cancer risk is not yet mature [6-7]. Therefore, how to intervene PN as early as possible to avoid the progression of its disease has become a key problem in the treatment of PN. Chinese medicine has accumulated rich experience in the treatment of PN, and the early

intervention of Chinese medicine in PN has become one of the important therapeutic means [8].

Professor Ma Zhanping is a famous traditional Chinese medicine practitioner in Shaanxi Province, chief physician, director of the Department of Respiratory and Critical Care Medicine of Shaanxi Provincial Hospital of Chinese Medicine, and master's tutor of Shaanxi University of Chinese Medicine, who has been engaged in the prevention and treatment of pulmonary diseases by combining traditional Chinese and Western medicines for more than 30 years, and who believes that traditional Chinese medicine therapies have obvious advantages in controlling the development of pulmonary nodules in the early stage, alleviating the clinical symptoms, and decreasing the risk of malignancy. In this study, the medical prescriptions of Professor Ma Zhanping in treating pulmonary nodules were collected and collated, and the data were analysed and organised using data mining techniques to summarise the characteristics and patterns of Professor Ma's medication in treating pulmonary nodules, which will provide new ideas for the clinical treatment of this disease.

## **2. Data and Methods**

### **2.1. Prescription source**

The medical records (including general information, medical history, diagnosis information, prescription drugs, etc. of patients who visited Professor Ma Zhanping's clinic of Shaanxi Provincial Hospital of Chinese Medicine for the first time from January 2023 to December 2023 and whose first diagnosis was "lung shadow" were selected.

### **2.2. Medical records inclusion criteria**

(1) According to the Chinese Expert Consensus on the Diagnosis and Treatment of Lung Nodules (2018 edition) [9], Patients with PN diagnosis;(2)Complete medical records;(3)The pulmonary CT in the outpatient medical record showed that the pulmonary nodules were  $\leq 8$ mm.

### **2.3. Exclusion criteria for medical records**

(1)Patients with repeated medical records;(2)Patients with other pulmonary diseases;(3)Pregnant and lactating women.

### **2.4. Input and check of medical record prescription**

According to the 2020 edition of the Pharmacopoeia of the People's Republic of China [10]. Standardized drug designation,The Chinese medicine not included was standardized according to the "Chinese Materia Medica" [11]. Using Excel2021, the prescription information was entered by special person and verified to ensure the accuracy of the data, so as to establish Professor Ma's PN prescription database.

### **2.5. Data analysis**

(1) Drug frequency statistics: Use Excel2021 to summarize and sort out data, and make statistics on the basic characteristics of traditional Chinese medicine, such as frequency, sex, taste and warp reduction. (2) Network analysis of high-frequency drug association rules: The complex network module in SPSSModeler18.0 series was used to analyze PN Chinese medicine, and the Web network diagram of PN core prescription was drawn according to the association relationship between Chinese medicine.

### 3. Results

#### 3.1. Frequency statistics of traditional Chinese medicine

In this study, we collected a total of 108 cases of pulmonary nodules treated in Ma Zhanping's clinic, all of which were first-time diagnosis cases, and analyzed the frequency of their Chinese medicine prescription, which resulted in a total frequency of 1564 times of drug use, involving a total of 137 flavors of traditional Chinese medicine. The top 30 most frequently used drugs are summarized in Table 1, with the top 10 most frequently used drugs being licorice, Codonopsis pilosula, Chaihu, Chenpi, Coix lacryma, Angelica sinensis, orange kernel, Astragalus membranaceus, Phellodendron amurense, and Shengma, in order of prevalence.

Table 1: Distribution of high-frequency Chinese medicine (frequency  $\geq 30$  times) in the treatment of pulmonary nodules by Professor Ma Zhanping

No.	Traditional Chinese medicine	Frequency/times
1	Licorice	106
2	Cdonopsis	75
3	Bupleurum	74
4	Tangerine peel	55
5	Coix seed	50
6	Chinese angelica	50
7	Semen citri	47
8	Astragalus	46
9	Thunberg fritillary bulb	45
10	Cimicifuga	44
11	Liriope	44
12	Schisandra chinensis	42
13	Reed root	42
14	Peach meat	41
15	Spina gleditsiae	34
16	Tuckahoe	33

#### 3.2. Statistics on the four qi, five flavors and meridians of drugs

The 137 flavors of drugs included in the study were subjected to statistics on the four qi, five flavors and meridians. Among the four qi of Chinese medicines, warm medicines were the most abundant, see Figure 1; the five flavors of Chinese medicines were the most abundant with sweet and bitter flavors, see Figure 2; and the attributed meridians of Chinese medicines were the most abundant with the lung meridian, see Figure 3.

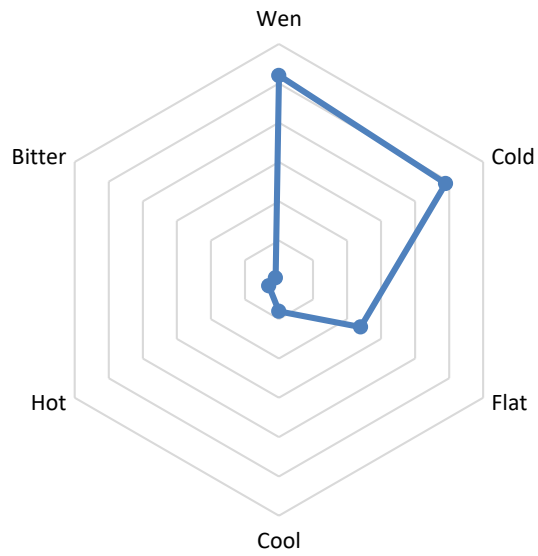


Figure 1: Radar chart of frequency distribution of four air in pulmonary nodules treated by Professor Ma Zhanping

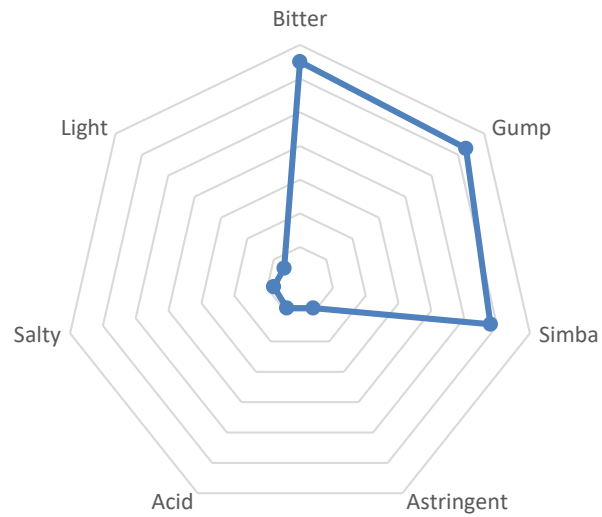


Figure 2: Radar chart of frequency distribution of the five tastes of pulmonary nodules treated by Professor Ma Zhanping

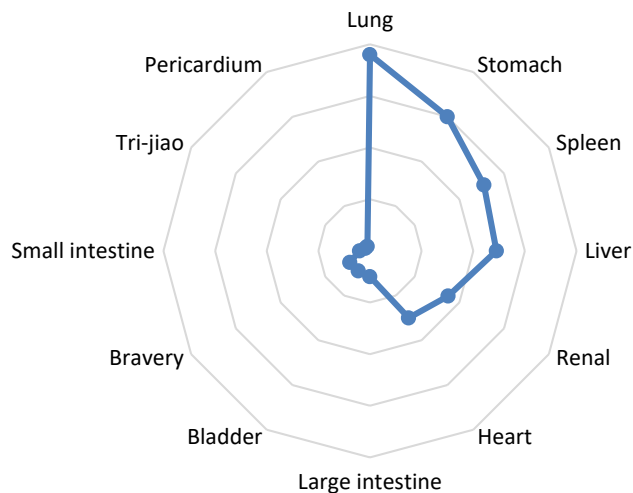


Figure 3: Radar chart of frequency distribution of attribution of lung nodules treated by Professor Ma Zhanping

### 3.3. High-frequency drug association rule analysis

Association rule analysis using Apriori algorithm, according to the importance of the drugs in the prescription, take the first 16 drugs to form the core prescription of Professor Ma Zhanping's treatment of lung nodules: Licorice, Codonopsis, Chaihu, Pericarpium Citri Reticulatae, Coix lacryma, Angelica Sinensis, Tangerine Kernel, Astragali, Zhenbeimu, Ascophyllum, Maitake, Schisandra, Rehmanniae Roots, Peach Seeds, Saponariae, Poria, see Figure 4.

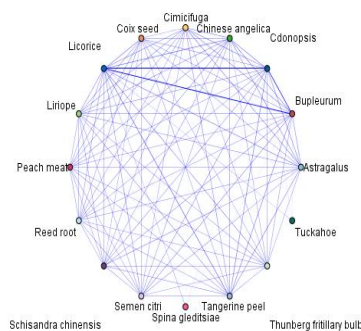


Figure 4: Professor Ma Zhanping's high-frequency drug association network for pulmonary nodules

## 4. Discussion

### 4.1. Analysis of etiology and pathogenesis

In traditional Chinese medicine, there is no record of pulmonary tubercle, but according to its cause, clinical symptoms, pathogenic characteristics and pathogenesis, it can be classified as "accumulation", "cough", "pulmonary accumulation" and "mass" [12]. The main causes of PN are

internal and external, with the internal cause being the deficiency of positive energy and the external cause being the accumulation of evil [13]. In the Treatise on the Origin and Symptoms of Various Diseases, it is stated that PN has no other causes than internal and external. The main causes of PN are internal and external, with the deficiency of positive qi on the inside and the evil on the outside [14]. The "The Origin and Candidates of Various Diseases" states, "Accumulation is caused by the disharmony of yin and yang, the weakness of the internal organs, and the wind and evil, and the qi that fights with the internal organs." The pathogenesis of PN can be summarized as this false labeling. [15] "Medical Zong Bianzhuang - accumulation": "the accumulation of those who become, the positive gas is insufficient, and then the evil entrenched." Prof. Ma Zhanping believes that PN occurs as a result of deficiency of positive qi and the feeling of external evils. Deficiency of positive qi is mainly a deficiency of lung and spleen qi. When the lungs lose declination and the spleen loses transportation, dampness accumulates as phlegm; when the lungs and spleen are deficient in qi, blood transportation is weak, and blood stagnation is stasis. On the basis of positive deficiency, phlegm obstructs blood stasis and stops at the lung channels, resulting in nodules. The introduction to medicine - accumulation of "five accumulation of six aggregates belong to the spleen", highlighting the close relationship between accumulation and the spleen. Li Dongyuan said, "The spleen and stomach are deficient, and the lung qi dies first [16]". Spleen loss of health transport, wet accumulation of phlegm, stored in the lung, is the so-called "spleen for the source of phlegm, the lung for the storage of phlegm". Therefore, the treatment of pulmonary nodules should pay attention to strengthening spleen and qi while supplementing lung qi.

#### **4.2. Analysis of the frequency of use of traditional Chinese medicines and their sexual flavors and attributes**

The results of the frequency of use of Chinese medicine show that bupleurum, orange peel, coix seed, angelica, orange kernel, astragalus and cohosh are high-frequency use of Chinese medicine, these drugs have the effect of nourishing spleen and stomach, filling lung Qi, soil Wangsheng gold, lung accumulation is treatment. As Chen Shiduo's "Secret Record of the Stone Room" said: "The method of treating the lung is very difficult to treat, when it is turned to treat the spleen, the temper has been nourished, then the soil itself produces gold [17]." Lung is a delicate organ, like moist evil dryness, Danxi said "gas is fire", the use of large teams of tonic drugs, fear of fire disadvantages, so the evidence is often accompanied by the use of Codonopsis pilosula, zhebei mother of pearl and other nourishing lung yin products, to achieve the purpose of the gas and yin double tonic.

The results of the five flavors of Chinese medicine show that bitter, sweet and pungent are the main flavors of the medicine. Pungent can move and disperse, and pungent disperses stagnation, moves blood and invigorates blood, which can make blood flow smoothly and dissipate stagnation. Suwen - yin and yang Yingxiang Lecture" contains "blood should be resolved" method. Bitter can purging, drain down the gas inverse, in line with the lung declared purging nature; sweet can complement and can slow, nourishing and replenishing the deficiency. And the lungs for the delicate organs, intolerant of cold, heat, dryness and dampness of the evil invasion, pure pungent, bitter taste is inevitably dry, also need to slow down the sweet taste. Chinese medicine is mainly used in the lung and spleen meridians. Lung nodules are mainly located in the lungs, and the lung meridian is the mainstay of Chinese medicine. According to Element Zhang's "The Essentials of Living Methods", "Strong people have no accumulation, but weak people do. Weakness of the spleen and stomach, failure of qi and blood, and sensations in all seasons can all lead to accumulation." Weakness of the spleen and stomach is an important condition for the formation of accumulation evidence, therefore, the treatment of pulmonary nodules should be based on the method of tonifying the spleen and stomach. Lung, spleen and qi are weak, and there is no source of

qi. There is a mutual relationship between the two organs in terms of fluid metabolism. When the spleen and qi of the lungs are deficient, the distribution of fluid is not good, and phlegm will be collected and formed into drink, so there is a saying that "the spleen is the source of phlegm, and the lungs are the vessel for storing phlegm". Lung and spleen in the coordination of qi, liver rise and spleen fall, coordinate with each other, on the whole body qi regulation plays an important role in regulating the smooth. If the elevation of the qi is out of order, then the qi will not be able to pass through.

### 4.3. Analysis of association rule results

Association rules network diagram shows that Professor Ma Zhanping commonly used licorice, codonopsis ginseng, bupleurum. "Medical prevention Vol.2 Miscellaneous Diseases Fatigue Injury" says: "Cohoshi, Bupleurum two taste thin, Yin Yang, from the earth to heaven, can lead to clear qi Line, in order to lift its sinking, and reference ginseng, licorice and other sweet and warm gas rise, in order to supplement the dissolution of wei Qi and real surface [18]." On this basis, Professor Ma Zhanping often adds orange peel to play the role of invigorating spleen and regulating qi, drying dampness and eliminating phlegm; Add coix seed to clear heat and diuresis, strengthen spleen and diuresis. Add astragalus big tonifying Qi, kidney filling essence, kidney Yang to produce lung Yang, maintain breathing depth, kidney master water, kidney deficiency water metabolism disorder, spleen wet water, stained in the lung, phlegm, with poria, stir-fried white art spleen oozing wet.

## 5. Conclusions

In summary, this study summarized Professor Ma Zhanping's clinical medication rules for pulmonary nodules through the methods of drug frequency, four qi and five flavor normalizing, association rule analysis and so on. The pathogenesis of lung nodules is summarized as the invasion of six evil qi, lack of healthy qi in the human body, especially lung qi deficiency, weak gasification, poor body fluid delivery, and accumulation of phlegm into drink, liver and lung qi machinery is not regulated, and gasification is blocked, resulting in the formation of visible and solid evil. According to the differentiation of different types of syndrome, the methods of supplementing lung Qi, invigorating spleen and supplementing qi, promoting blood circulation and removing blood stasis, clearing heat and removing phlegm, detumifying and dispersing are the key to the treatment of pulmonary sarcoidosis. However, the data source of this study is still relatively limited, and the data analysis results need to be further studied and confirmed in clinic.

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